

# Lower face and lifting treatments

## Abstract

Lower face age changes are hugely impactful on the overall ageing concerns presented by patients, and lower face-lifting treatments form an integral part of the rejuvenation and beautification of the face, as part of a comprehensive treatment plan. It is essential that the clinician possesses a deeper understanding of facial anatomy in this region, to allow a more holistic, rather than isolated, approach to rejuvenation and reduce complication risks and downtime. A combination of dermal filler and neuromodulators can be used in the lower face to produce effective, long-lasting and natural facial rejuvenation results.

## Key words

► Dermal filler ► Hyaluronic acid ► Rejuvenation ► Lifting  
► Neuromodulator

Using the horizontal thirds concept to divide the face, the lower face refers to the area from the subnasale to the menton (Jeong et al, 2020). This area often shows the most undesirable ageing signs, such as deep oral commissures, loss of definition of the mandibular arch and pronounced platysmal bands. Further division into the facial aesthetic units can be defined, such as the upper and lower lip unit, the buccal and lateral cheek units and the mental unit (Jeong et al, 2020). To assist with the understanding the relation between the lower face and neck and a more global approach to rejuvenation, the authors have also chosen to discuss treatments used to lift the neck and treatment of the platysmal muscles.

## Fat compartments

There are four fat compartments in the mandibular region: the superior and inferior mandibular fat compartments, the submandibular fat compartment and another, which covers the parotid-masseteric

fascia (Braz et al, 2015; Braz and de Paula Eduardo, 2020). Further to this, the mental, submental fat pads, as well as the lower extension of the buccal fat pad, are important in this region.

## Muscles

Fibres from the platysma interdigitate closely with the mandibular septum and are inserted at the anterior border of the mandible (Braz et al, 2015). At the mental area, there are three key muscles involved: the depressor anguli oris (DAO), the depressor labii inferioris (DLI) and the mental muscle, which merge with the platysma below (Braz et al, 2015). All the muscles within this region have a close relationship with the orbicularis oris (OO) muscle (Braz et al, 2015).

The OO muscle consists of surrounding muscles interdigitating into the lip region, and functions to close and project the lips outwards, as well as causing perioral rhytids (Braz et al, 2015). The DLI muscle arises from the mandibular line and goes upward to insert into the lower lip, and it acts to depress the lower lip (Braz et al, 2015). The DAO muscle arises from oblique line of the jaw, the fibres converge and then insert into the angle of the mouth. It acts to depress the corner of the mouth, and is fused with the platysma muscle (Braz et al, 2015).

The mentalis muscle originates from the mandible, over the mentum and inserts into the skin below the lower lip (Braz et al, 2015). It acts to elevate and project the lower lip outward, as well as causing wrinkling of the chin skin (Braz et al, 2015; de Maio et al, 2017). The masseter muscle has a square shape with a superficial and deep portion (Braz et al, 2015). The superficial portion is the largest, arising from the zygomatic process and from the anterior third of the inferior border of the zygomatic arch (Braz et al, 2015).

The platysma muscle of the neck varies considerably in thickness and extent between people. It is composed of two separate broad, thin sheets of muscle running up the front and lateral from the upper chest to the mandible, fusing and blending its fibres with the superficial muscular aponeurotic system (SMAS) superiorly in the face (Jabbour et al, 2017). The downward pull of the platysma and DAOs contributes to the formation of jowls and multiple rhytides, as well as loss of definition in the chin and jawline. Gravity also contributes to the changing appearance of the thin, lax and less elastic skin of the aged neck, accentuating the neck lines, which, coupled with fat volume depletion, leads to noticeable ageing of the neck (Figure 1).



**DR JEMMA GEWARGIS**

Dental Surgeon, Aesthetic Practitioner and Trainer  
E: [info@drjemma.com](mailto:info@drjemma.com)



**DR VIKRAM SWAMINATHAN**

Aesthetic Doctor and Trainer, Clinic@



Figure 1. Lines and fat volume depletion lead to noticeable ageing of the neck

### Vascularisation

The facial artery appears 3cm in front of the jaw angle, with many other vascular branches appearing after that (the inferior labial artery, superior labial artery and angular artery) (Braz et al, 2015). The facial artery crosses the inferior border of the mandible, anterior to the insertion of the masseter (Braz and de Paula Eduardo, 2020). The primary blood supply to the chin consists of the mental and submental arteries, which exit the mental foramen on the chin laterally (de Maio et al, 2017; Braz and de Paula Eduardo, 2020). The superior and inferior labial arteries are found in the submucosal region of the lip, where the wet–dry border exists (de Maio et al, 2017). Loss of volume in the lip complex can accentuate the ageing of the perioral region (Greco et al, 2012).

### Aetiology for ageing in this region

Ageing in the lower face is multifactorial, with atrophy of the fat compartments, as well as their inferior migration, combined with repetitive activity of facial musculature, playing a significant role (Braz et al, 2015; Carruthers and Carruthers, 2016). The fat compartments descend towards the neck and the mandibular septum loosens, coupled with bony resorption and increased skin laxity, resulting in an undesired aged appearance where the jawline loses definition and jowls form (Braz et al, 2015; Carruthers and Carruthers, 2016; de Maio and Rzany, 2016; Braz and de Paula Eduardo, 2020). The important bony changes in this area include the superior and posterior movement of the maxilla, which sharpens the bony angles of the pyriform aperture, maxilla and mandible (Carruthers and Carruthers, 2016). The widening of the orbital aperture and mandibular angle, with reduction in the mandibular length and height, further exacerbates the ageing process, with

the changes being more dramatic in women and at an earlier age (Carruthers and Carruthers, 2016). Below the mental foramen, a triangular-shaped bony defect creates the geniomandibular groove ('prejowl') superficially (Farollch Prats et al, 2020). Achieving successful aesthetic outcomes here requires a full appreciation of the ageing process. The ability to augment the highly compartmentalised facial fat compartments with dermal filler allows the volume loss associated with ageing to be corrected.

The skin of the neck drops, folds develop and the marionette lines deepen with ageing in the lower face, as a result of mandibular bone resorption (Carruthers and Carruthers, 2016; Bertossi et al, 2020). Furthermore, with age, the lips thin and resorb and alter in their length and projection due to the supporting hard tissue changes that underlie the soft tissues (Carruthers and Carruthers, 2016; Bertossi et al, 2020). Skin ageing, primarily due to exposure from ultraviolet (UV) radiation, alters its appearance, resulting in irregular texture, loosening and wrinkling (Carruthers and Carruthers, 2016).

### Considerations for treatment and patient selection

In addition to carrying out a thorough history of the presenting complaint, medical history and aesthetic treatment history, the patient's expectations should be discussed in detail. The patient should be assessed in static and in animation (smiling and pouting) in an upright position. Clear clinical photography should be taken in frontal, lateral and oblique views, at both static and animated expressions (Braz and de Paula Eduardo, 2020).

When treating the pre-jowl and jawline region, those with a slim neck who have fat loss (hypotrophy) along

the jawline will see the most significant changes. Patients who have excess fat in this region will not benefit from this treatment (Braz et al, 2015; Farollich Prats et al, 2020). In cases with severe skin laxity, loss of contour and volume deficiencies, a surgical approach should be considered.

Non-surgical treatment should include a combination of skin-tightening and volumising of the substructures using dermal filler and appropriate devices, such as radiofrequency, fractional lasers or mesotherapy treatments (Braz et al, 2015; Carruthers and Carruthers, 2016). It is often appropriate to also combine the use of both dermal fillers and a neuromodulator to maximise the lifting capabilities in this area. This can work synergistically to prolong the activity of the dermal filler, enhancing treatment outcomes and, therefore, improving patient satisfaction. For patients with little fat in this area, there is a risk of filler injected too superficially being visible, and, hence, proper assessment of injection depth, as well as patient suitability, is important.

In addition to considering patient selection, it is important to select the correct dermal filler product for the indicated area and desired aesthetic outcome. The lifting effect that can be achieved by hyaluronic acid (HA) dermal fillers is characterised by many features, including the HA concentration, the degree of crosslinking, ratio of high- to low-molecular weight HA, cohesivity and gel hardness (otherwise known as G' prime) (Dhillon and Patel, 2020). Product selection can have a substantial influence on the risk of complications, as well as the likelihood of treatment success. To achieve substantial lifting, the appropriate filler with a high G' prime should be selected. More hydrophilic fillers have a lifting effect after placement due to their properties in absorbing fluid, providing greater lift for less volume of filler placed (Wollina, 2015).

### Treating the lower face

Historically, surgical facelift methods were considered the answer to lifting and rejuvenation of the lower face. However, the advances in techniques, product capabilities and understanding of anatomy and ageing in this region have allowed an increase in demand in non-surgical methods to lift the lower face, with reduced downtime, risks and complications compared to surgical options (Jeong et al, 2020).

Non-surgical rejuvenation of the lower face using HA dermal fillers and neuromodulators can help to lift the soft tissues to reshape the jawline region to improve the appearance of the area (Braz and de Paula Eduardo, 2020). Calcium hydroxyapatite can also be used in the augmentation of the lower face; however, the authors will focus on the former modalities of treatment. The treatment of the lower face can be challenging, and so, a detailed knowledge of facial anatomy, filler quantities

and injection techniques is necessary to reduce the risk of unwanted side effects and complications.

Volume loss in the upper and mid-face contributes to heaviness and skin laxity in the lower face. Thus, it is important to consider a global approach to rejuvenation by adding support and revolumising the upper and mid-face accordingly, potentially prior to lower face treatments where indicated (Braz et al, 2015; Carruthers and Carruthers, 2016; Rossi et al, 2017; Suwanchinda et al, 2018; Casabona et al, 2020; Dhillon and Patel, 2020). Augmentation of the temple can soften age-related changes in the lower face, including the jowl deformity and marionette lines, through lifting the tissues (Suwanchinda et al, 2018). It has been demonstrated that deep HA filler injections into the upper and mid-face can improve the upper lip show due to the resulting changes in the SMAS and labial fold (Wollina, 2015; Casabona et al, 2019; Solish et al, 2019). Injection of filler around the mouth to increase support to the tissues here is crucial for revitalisation of the ageing lower third of the face (Carruthers and Carruthers, 2016).

### Marionette lines and surrounding anatomy

Melomental folds, also referred to as marionette lines and puppet lines, are the creases formed between the commissures of the mouth and the area besides the chin. They are a key indicator of the ageing face. They are commonly a patient's presenting complaint, in that they feel their appearance conveys a sad or unhappy facial expression. These usually result from volumetric ageing changes associated with the lateral lower and mid-face. Consequently, it is best to address these ageing changes prior to treating the marionette lines directly. By addressing the causative factor primarily, rather than the symptom of volume loss, a more aesthetically pleasing and natural rejuvenation of the face can be achieved. However, the authors acknowledge that direct treatment to this area is often needed to maximise the results obtained.

Treatment of this area with dermal filler can be challenging due to the lack of bony support in this region, which makes a lifting effect here more difficult (Braz et al, 2015). Therefore, a combination treatment approach is recommended. Simultaneous treatment of the marionette lines and the DAOs with dermal filler and botulinum toxin type A (BoNTA), respectively, can be performed on the same day as part of a comprehensive treatment plan (Braz et al, 2015; Mess, 2017). A combination approach prolongs the activity of the filler by decreasing the activity of the mimetic muscle in this region, thus slowing the absorption of filler, leading to better aesthetic outcomes (Braz et al, 2015; Carruthers and Carruthers, 2016). The authors advise administering the neuromodulator following dermal filler treatment to minimize the spread of BoNTA into adjacent regions and muscles. Lower doses of neuromodulator can be used to

modulate, rather than paralyse, muscles where volume deficits influence muscle activity (Sundaram et al, 2016). A dose of 2–4U of BoNTA can be administered at each DAO site by injecting near the jawline, at least 1cm away from the corner of the mouth and at half the needle depth (de Maio et al, 2017). Relaxing of the DAO muscle allows lifting of the lateral oral commissures (Greco et al, 2012; Mess, 2017). Excessive dosages or injecting too medially can cause an asymmetric smile, as the DLI muscle may be treated (de Maio et al, 2017).

Dermal filler can be placed in both the deep dermis and subdermal layers using a needle or administered in the subdermis with a cannula. Most of the volume should be administered to the superior one-third of the fold, while staying medial (de Maio et al, 2017). Sound anatomical knowledge is crucial in this area to reduce the risk of vascular occlusion, haematoma, bruising and overall patient discomfort. The mental nerve, artery and vein are in close proximity to the inferior aspect of the marionette line (Braz et al, 2015).

A multimodal approach in this region allows both causative factors to be addressed, namely volume loss and hyperactivity of the muscles in this area (Braz et al, 2015; Carruthers and Carruthers, 2016). Dermal fillers provide the necessary support and structure to help lift, while neuromodulator treatment can reduce the dynamic depressive actions of the related lower face muscles (Carruthers and Carruthers, 2016; de Maio et al, 2017).

### Labiomental sulcus

The labiomental or mental crease develops due to soft-tissue volume loss, reduced skin elasticity, hyperdynamic contraction of the muscles in the lower face and resorption of the mandibular bone (de Maio et al, 2017). Injections to this area should be in the subcutaneous plane with a linear retrograde technique, again ensuring that aspiration is carried out beforehand (if using a needle), with slow and careful delivery of dermal filler.

### Jawline and pre-jowl sulcus

One of the main changes in the lower third of the face is ptosis of the labial commissure, resulting in the triangular deformity known as the marionette line at the corner of the mouth, increasing the labiomental sulcus and decreasing the concavity between the jaw and neck (Farollich Prats et al, 2020).

The pre-jowl sulcus corresponds to the area from the mental foramen to the mid-lateral zone of the mandible, which is demarcated by the mandibular ligament (Braz et al, 2015; de Maio et al, 2017). The jowl forms due to ptosis with hypotrophy or hypertrophy of tissues and the loose adherence of the platysma to the mandible (Braz and de Paula Eduardo, 2020).

Supporting and lifting of the pre-jowl sulcus with dermal filler reduces the marionette lines, lifts the

corners of the mouth and helps definition of the jawline posteriorly (Braz et al, 2015). A single entry point anterior to the jowl can be used with small aliquots of HA dermal filler in a retrograde fanning motion using a needle. A high G' prime product with high cohesivity can be used here to maximise lifting (for example, Yvoire Volume Plus or Yvoire Contour). Preferably, cannulae can be used in this region with a single pilot entry point using 23G pre-hole and a 25G, 38mm cannula with a retrograde linear technique into the superficial subcutaneous plane (Braz and de Paula Eduardo, 2020; Farollich Prats et al, 2020). Attention to and correction of the area just below the mandible can soften the depression in this region (Braz et al, 2015). While there is a reduction in risk of bruising, swelling and vascular compromise with use of a cannula, there is loss of precision and the tactile feel that can be obtained with the use of needle. The youthful aesthetic endpoint is to achieve a straighter jawline and a smooth transition between the jowls and chin by lifting with dermal filler.

### Mandibular body, angle and ramus

Prior to treatment of this area, it is important to palpate the mandibular angle and determine the location of the parotid gland, facial artery and vein. Product can be placed in this region with a cannula using a retrograde linear thread in the subcutaneous plane. When treating the mandibular contour, it is important to replace volume in a sequence to obtain maximum lift from the use of dermal filler, in a pattern that counteracts the force of gravity—from the upper to lower areas (zygomatic, preauricular and then mandibular region) (Farollich Prats et al, 2020).

For masculinisation, usually, a higher G' prime product is necessary to lift the thicker skin (Rossi et al, 2017). Furthermore, dermal filler can be used to lift and define the angle of the jawline, to create the masculine feature of a squared lower face. Anterior chin projection also acts as an anchoring point to help pull the tissues forward and further define the jawline region (Rossi et al, 2017).

### Preauricular area

The preauricular region is the superficial region that tends to be where significant volume loss occurs. Addressing this area recreates the oval contour of the face and helps to lift the tissues of the lower face. Dermal filler is injected subcutaneously in the temporal lateral cheek fat compartment using a cannula, and a fanning technique volumises the area (Farollich Prats et al, 2020).

### Chin

The chin is composed of the structures above the mental symphysis (Braz et al, 2015). Treatment of the chin plays a crucial role in full facial rejuvenation, as well as treatment of the lower face and lifting the tissues of

the submandibular region (Dhillon and Patel, 2020; Sahan et al, 2020). Reshaping the chin with HA dermal filler helps to bring balance, harmony and proportion to the face. The skeletal occlusion should be assessed, as treatment is particularly indicated in those with a class II malocclusion with an associated overbite/overjet (de Maio et al, 2017; Braz and de Paula Eduardo, 2020; Dhillon and Patel, 2020). Furthermore, those with retrognathia ('weak chin') can benefit from this treatment. In women, the chin width is equivalent to the medial intercanthal distance, whereas, in men, the width of the mouth is used as the anatomical reference (Braz and de Paula Eduardo, 2020).

Rejuvenation of the lower face to achieve a lifting ability with HA filler usually requires a product with high lifting capacity and robust viscosity to correct the volume depletion around the pre-jowl sulcus, building support around the mandible and oral commissure (Braz et al, 2015; Carruthers and Carruthers, 2016). Adding definition and structure to this region can help to fill and soften the 'peau d'orange' chin and pronounced pre-jowl sulcus (Carruthers and Carruthers, 2016).

In this area, high G' prime products provide sufficient lift when injected onto the bone and should have rheological properties to allow a natural result at rest and on animation. The menton (most inferior projecting point of the chin) and chin midline should be identified as important reference points (de Maio and Rzany, 2016; Sahan et al, 2020). Injection onto the bone with a needle (27G) requires aspiration and a slow, steady and careful injection speed. It can be helpful to pinch the chin while administering filler to reduce the risk of unwanted displacement (de Maio et al, 2017). A cannula can be used (25G, 50mm) if the skin is tightly adhered to bone or to access multiple areas of the chin with a reduced risk of swelling and bruising (Braz et al, 2015).

Injecting directly onto the bone where possible and aspirating prior to a slow and steady injection helps to reduce the risk of intravascular injection. Blanching and/or pain along the facial artery distribution are warning signs of a potential vascular occlusion/embolism and require swift intervention with hyaluronidase (Braz et al, 2015).

### Platysma and neck

Rejuvenating the neck is challenging, and dermal fillers are indicated for the structural lifting around the chin and jawline, with neuromodulator use around the masseter and vertical platysmal bands to complement this (Carruthers and Carruthers, 2016; de Maio et al, 2017; Rossi et al, 2017). Additionally, fat dissolving using deoxycholic acid to reduce the submental adiposity can help to further define the jawline. BoNTA to treat masseteric hypertrophy can also help to restore balance and symmetry to the jawline by reducing the size of the

bulky muscle (Lowe and Yamauchi, 2004; Carruthers and Carruthers, 2016).

Rejuvenation of the neck using the Nefertiti neck lift technique is minimally invasive, safe and an effective lifting treatment with a very high patient satisfaction rate (Levy, 2015). The success is due to the 'facial lifting' technique, which involves manipulating the opposing effects of the platysma depressor muscles to allow elevator muscles to predominate to lift the face, with the long-term aim to strengthen them over time. Injecting with BoNTA releases the downward tension on the jawline, alleviating the depressor effect and enhancing the unimpeded elevator muscles lifting action (Jabbour et al, 2017). This sharpens and redefines the mandibular border, while also elevating the corners of the mouth and relaxing the upper platysma, producing the Neferiti neck lift (Jabbour et al, 2017).

At a 15-degree angle, 2U BoNTA should be injected intradermally at each point along the vertical band, starting approximately 2cm below the inferior border of the mandible centrally in the submental area and approximately 1cm below the inferior border of the mandible, lateral to the origin of the DAO (Jabbour et al, 2017). Repeat injections at 1.5-2cm from each other, descending down the neck towards the border of the clavicle. The midline portion of the neck around the laryngeal area is avoided to minimise the risks associated with inadvertent deeper injections in this region (Jabbour et al, 2017).

There will be an improvement in the cervicomental angle, elevation and flattening of the jowls, reduction of the horizontal skin creases and vertical platysmal banding (de Maio et al, 2017). Furthermore, the overlying skin sheen and texture will be enhanced (Wollina, 2015).

A standard maximum dosage of 40U BoNTA is recommended for the Nefertiti lift in one sitting, with 20U distributed at each side of the neck (Levy, 2015). Injections of BoNTA into some facial muscles can have a longer lasting effect (for example, 6 months or longer) compared to the effects of upper facial muscles (for example, corrugators or orbicularis oculi of approximately 4-5 months) (Lowe and Yamauchi, 2020).

Treatment of the lower face and vertical bands of the neck using BoNTA with the Nefertiti lift is usually safe, and there is a low incidence of complications (Jabbour et al, 2017). When complications do occur, this is usually as a result of either improper technique or excessive dosage. In rare cases, dysphagia and dystonia have been reported (Levy, 2015; Jabbour et al, 2017). Other rare complications include an asymmetric smile, disruption of lip competence causing incontinence of food and liquids, dysarthria and dysphonia (Jabbour et al, 2017).

### Conclusions

Patients commonly present with characteristic signs of ageing in the lower face. A sound understanding of the

aetiology of ageing and anatomy in this region allows a tailored approach to lifting treatments to reduce the signs of ageing. Botulinum toxin and HA dermal filler treatments allow lifting treatments with reduced downtime, complications and invasiveness compared to traditional surgical methods. Thus, the demand for these treatments has increased, and practitioners will find the discussed lifting treatments useful in formulating full-face rejuvenation treatment plans.

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## Key points

- Lower face age changes are hugely impactful on the overall ageing concerns presented by patients
- Lower face lifting treatments form an integral part of the rejuvenation and beautification of the face and are part of a comprehensive treatment plan
- A deep understanding of facial anatomy is essential in this region, and it allows a more global, rather than isolated, approach to rejuvenation, as well as reducing the risk of complications and downtime
- A combination of dermal filler and neuromodulators can be used in the lower face to produce an effective, long-lasting and natural facial rejuvenation result.

## CPD reflective questions

- List the four fat compartments in the mandibular region
- Which blood vessels provide the primary supply to the chin?
- Which property of fillers allows for greater lift for less volume after injection?
- Why can a combination approach of treating the marionette lines and depressor anguli oris with dermal filler and botulinum toxin, respectively, lead to a better aesthetic outcome?

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